

MEASURING ENVIRONMENTAL VALUE IN NONMONETARY TERMS: A REVIEW

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Background Issues:

- **GPRA requires measurement of program progress in achievement**
 - This includes environmental achievements
 - OMB prefers monetary measurement
- **Most measurement has been non-monetary**
- **Different metrics have proliferated**
- **Metric relationship to value is often unclear**
 - Confuses cooperation and coordination
 - Impedes achievement of national goals
- **The Corps has long sought improved metrics**
- **The review was conducted for that purpose**

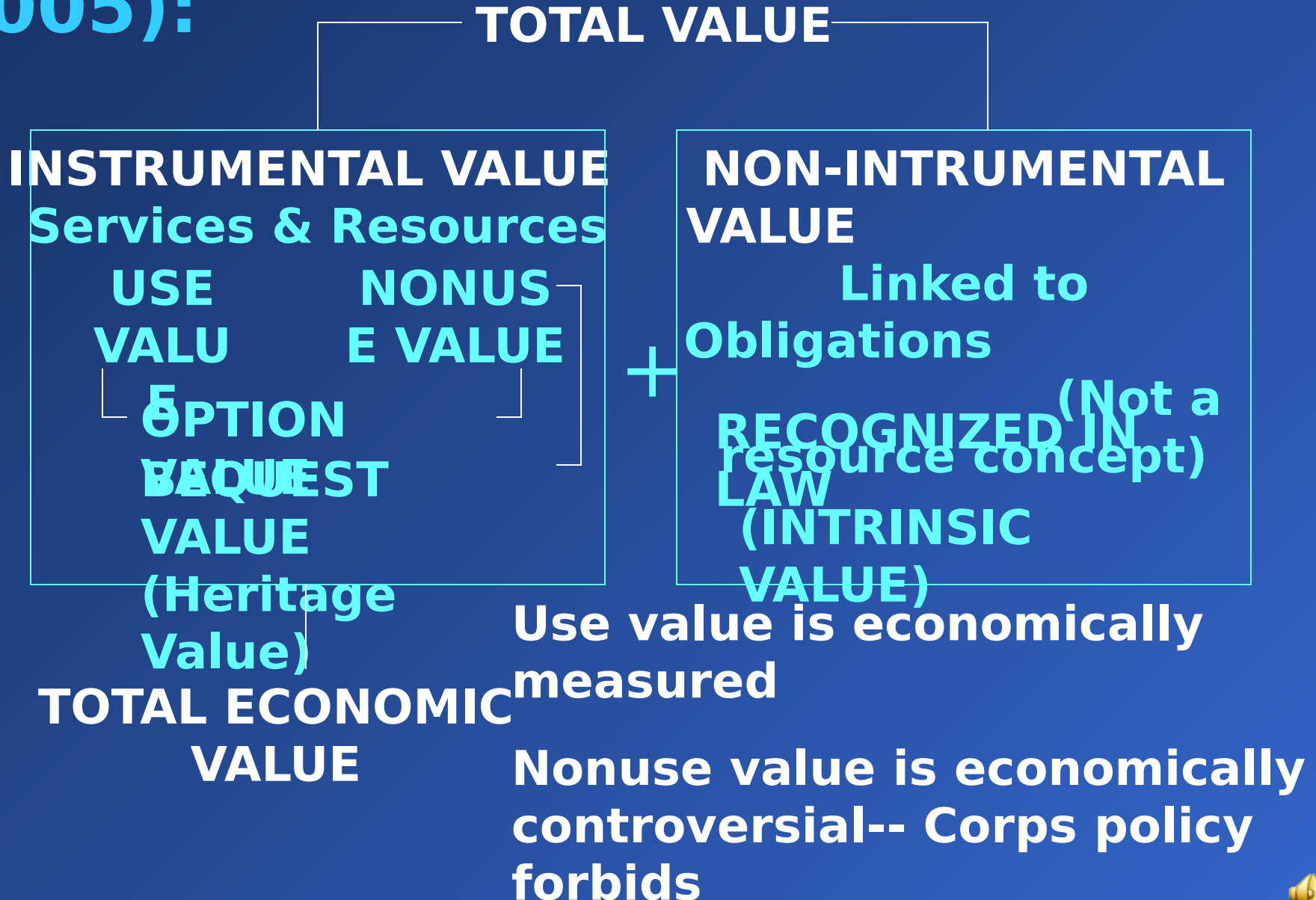


Objectives: Review...

- **Values classification**
- **Measurement of environmental value in government**
- **Measurement of environmental value in nongovernment**
- **Common elements of measurement**



Value Classification (NRC 2005):



GOVERNMENT MEASUREMENT OF ENVIRONMENTAL VALUE:

- **Most agency authority is programmatic**
- **Value is established in statutory goals**
 - **Goals indicate public desire for more or better**
 - **Achievement is measured using diverse performance indicators**
- **Links between measure and value added are often unclear**
- **Typically includes an unsorted mix of use and nonuse values**



Recommended Indicators (NRC

2000)

- **Extent and Status Indicators**

Land cover

Land use

- **Ecological Capital**

Total species diversity

Native species diversity

Nutrient runoff

Soil organic matter

- **Ecological Functioning**

Carbon storage

Production capacity

Net primary production

Lake trophic status

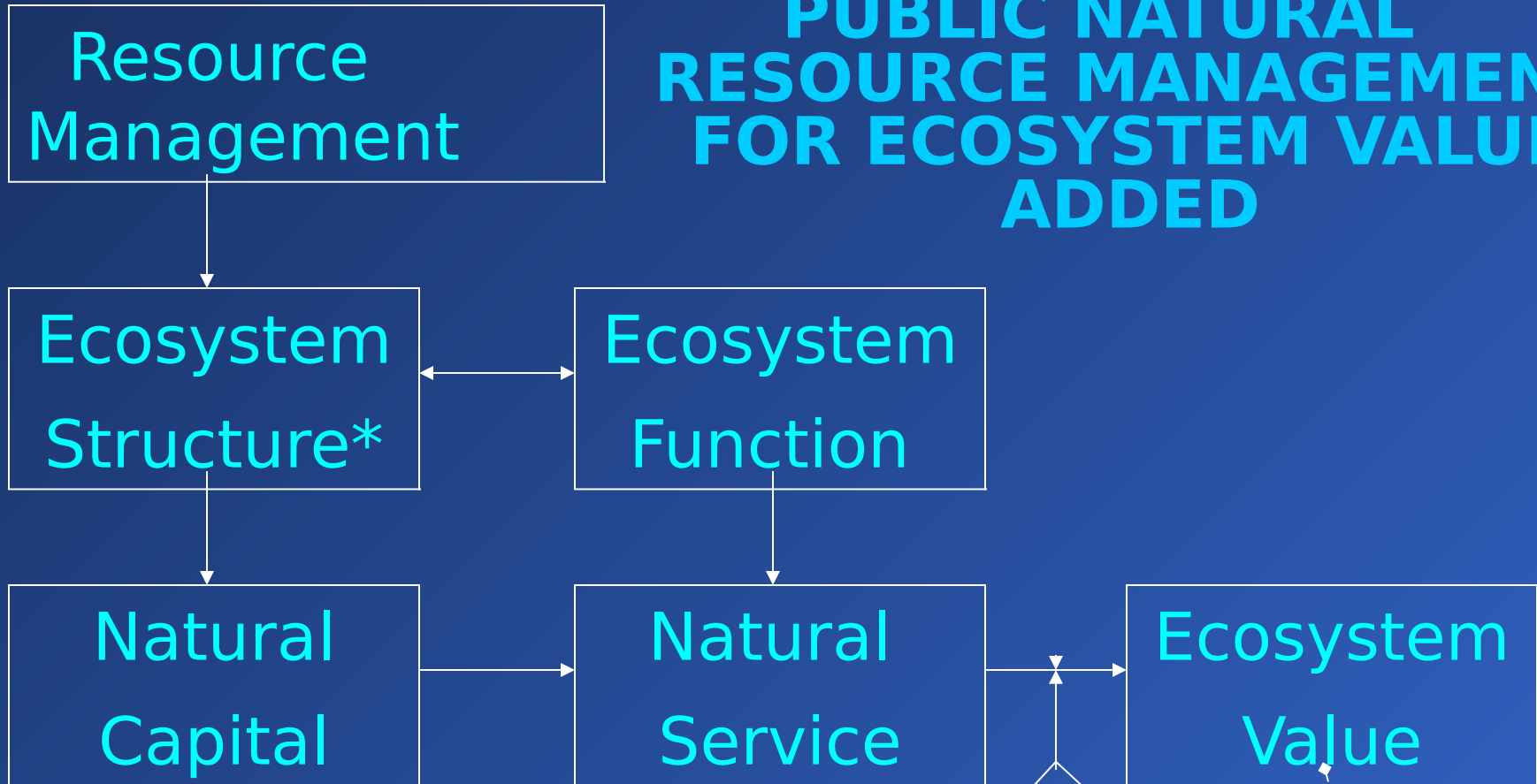
Stream oxygen

Nutrient-use efficiency

Nutrient balance



PUBLIC NATURAL RESOURCE MANAGEMENT FOR ECOSYSTEM VALUE ADDED



*Note: Species are key because they drive and maintain ecosystem function





National Environmental Policy Act:

- **Goal of beneficial development**
- **Goal of natural and cultural heritage protection**
- **Advises full compensation of replaceable resources**
 - **Advises compensation for lost use value**
- **Advises avoidance of irreplaceable resources**
 - **Advises their nonuse protection**
 - **Resource rarity (scarcity) is important**
 - **Resource distinction is important**
 - **Cumulative risk to resources is important**



Endangered Species Act:

- **Objective is to recover and sustain species viability**
- **One of the few laws that serves nonuse value**
- **Listing decisions are made based on biological criteria—rarity, threats, distinction**
- **Natural heritage is an explicit target**



Corps Ecosystem Restoration Planning Policy:

NER Objective Contributions:

- Are valued changes in ecological resources
- Are not cultural, aesthetic or water quality
- Cannot be measured in monetary terms*
- Are functions of habitat improvement

Ecosystem Restoration Study Objective:

- Contributions are desired outputs
- Restored via a more natural [naturalistic] ecosystem state
 - Self-regulating and sustainable
 - With high biodiversity
- Targets “biologically desirable species” & native species

* Nonuse value cannot be measured in monetary terms

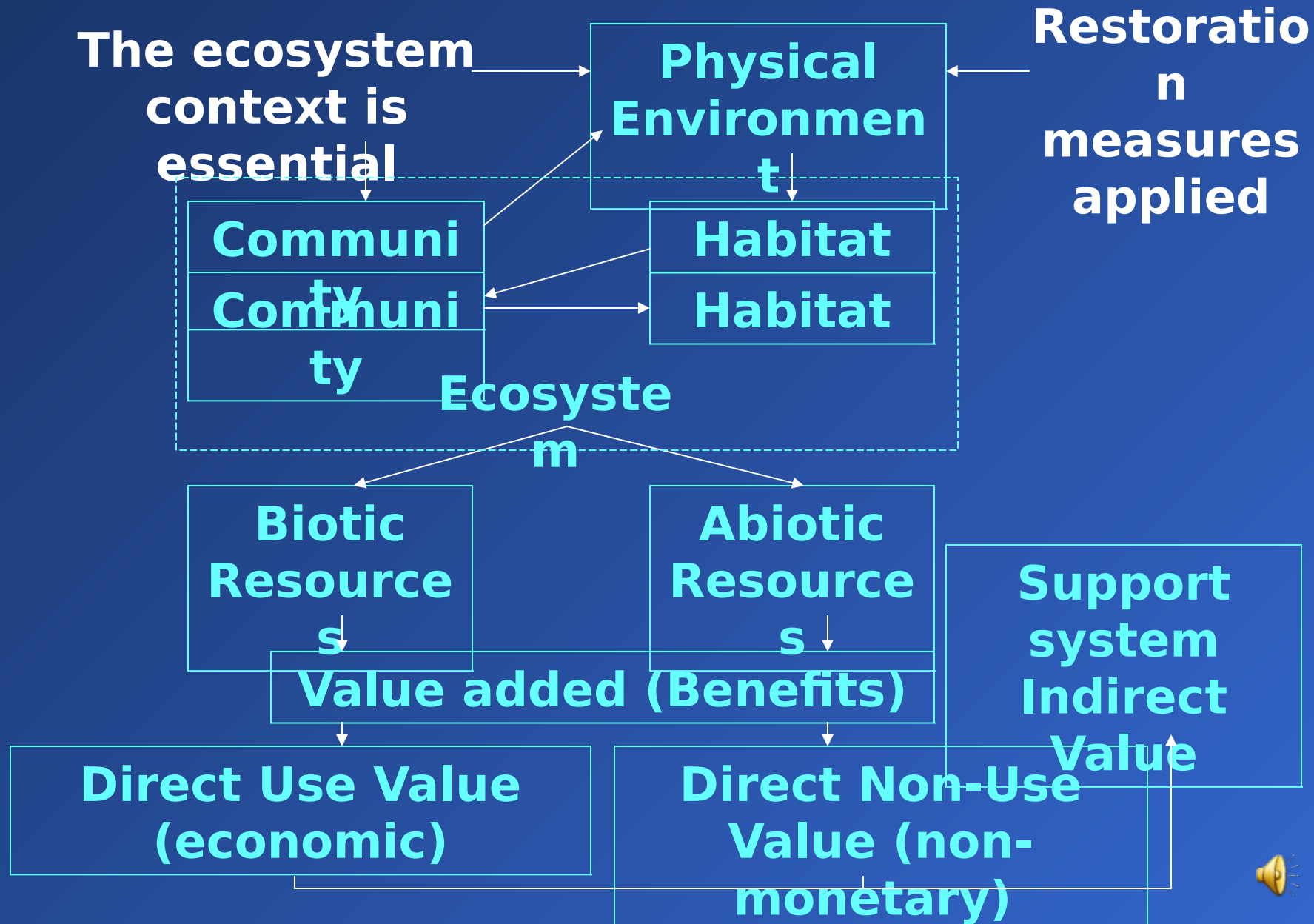


Measurement In The Corps:

- **The justifying benefit must not be economic**
- **The benefits metric must apply across plans**
- **Different metrics are allowed among projects**
- **Many incommensurate metrics have been used**
- **The links from metrics to value is often unclear**
- **Cannot simply sum-up benefits across projects**



Benefits Flow From Restoration:



Environmental NGOs:

- **Value is determined by mission and bylaws**
- **These indicate membership's desired output**
- **These are translated into measurable objectives**
- **Many NGOs invest in a mix of use and nonuse value**
- **Biodiversity conservancies invest primarily in nonuse values**



Conservation NGO Ranking

~~Criteria:~~

- **Rarity**—basic; genes, species, ecosystems
- **Threat**—used when sources/trends known
- **Distinctiveness**—used when known--endemism
- **Species Richness**—used when rarity not known
- **Representativeness**—used with richness
- **Function**—keystone influence (for species focus)
- **Utility**— economic gain (for species focus)
- **Feasibility (Cost)**—basic; costs and risks.

Notes:

Ecosystems are identified by species composition
A security criterion combines rarity and threat



Two Common Approaches:

Score $\frac{R(D)(T)}{C}$ Used where much knowledge, such as in the United States

Score $= \frac{S(X)}{C}$ Used where little knowledge, such as in equatorial areas

R = rarity of species in system (where data exist);

C = ecosystem geographical area (where few data)

T = threat to species and ecosystem integrity

D = distinctiveness of species and ecosystem



CONCLUSIONS:

- **Most environmental value is indicated in nonmonetary metrics**
- **Most indicators include values that can be measured in monetary terms**
- **The Corps must separate monetary and nonmonetary values**
- **The ESA, private conservancies and the Corps have natural heritage interest in common**
- **Resource scarcity, distinction (irreplaceable), risk of failure and costs are common elements for determining value.**

